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Agilent Technologies

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Saturn® 2000 GC/MS
Pre-Installation Instructions

The information provided here will help you identify and prepare a suitable installation site for your Saturn GC/MS. After you have prepared the site, and your Saturn GC/MS has been delivered, please contact your local Varian, Inc. office to schedule your installation.

For Saturn 2100 systems, refer to these instructions plus the 3900 GC Pre-Installation Instructions. For other Saturn systems, refer to these instructions plus the CP-3800 GC Pre-Installation Instructions.

The Varian Saturn GC/MS has been designed to operate reliably under carefully controlled environmental conditions. It is your responsibility to provide a suitable location, power source, and operating environment. Operating or maintaining a system in operational conditions outside of the power and operating environment limits described below could cause failures of many types. The repair of such failures is specifically excluded from the Warranty and Service contract conditions.

CAUTION **All phases of the installation site preparation must conform to local safety, electrical, and building codes. These codes take precedence over any recommendations in these instructions, and compliance to them is the responsibility of the customer.**

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Space and Weight Requirements

Before arranging for delivery of the Saturn GC/MS to your facility, please make sure that all passages to the site of installation are at least 91.5 cm (36 in.) wide. Allow additional room for maneuvering the shipping container around corners and/or through doors.

Table 1 identifies the space and weight requirements of the Saturn GC/MS components. The Saturn GC/MS is intended to sit on a workbench that is wide enough and deep enough to accommodate these components, and sturdy enough to support their combined weight. Varian recommends the layout shown in Figure 1, and the space allowances in Table 2.

Table 1 Dimensions and Weights of the Saturn System Components

	Height		*Width*		*Depth*		*Weight*	
Instrument	***in.***	***cm***	***in.***	***cm***	***in.***	***cm***	***lb.***	***kg***
Saturn MS[1]	18	46	12	30	22	56	66	30
3900 GC	18	46	13	32	22	56	51	23
CP-3800 GC	20	51	26	66	22	56	95	43
CP-8400 AutoSampler / CP-8410 AutoInjector (sits on top of GC)	16	41	9	23	18	46	20	9
CP-8200 AutoSampler (sits on top of GC)	20	51	6	16	16	41	24	11
Tekmar 3000 Purge and Trap	19	48	9	23	18	46	37	17
Archon Purge and Trap AutoSampler	17	43	22	55	21	53	80	36
Tekmar ALS-2016	27	69	15	38	15	38	35	16
Genesis Headspace AutoSampler	22	56	28	71	18	46	110	50
Saturn Chromatography Workstation[2] (computer with monitor, approximate values)	20	51	17	43	21	53	35	16

[1]Allow an additional 76 cm (30 in.) of vertical clearance above the mass spectrometer module to allow for routine maintenance.

[2]Allow an additional 20 cm x 20 cm (8 in. x 8 in.) of bench space beside the keyboard for mouse operation.

Table 2 Spatial Set-up Requirements for Saturn GC/MS

Recommendations	***Purpose***	***Recommended Distance***
Allow adequate space to the right of the GC/MS.	Permit access to the transfer line and turbomolecular pump. See Figure 1.	~ 61 cm (24 in.)
Allow adequate space behind the system.	Provide clear space for air circulation, gas lines, and electrical connections.	15 to 30 cm (6 to 12 in.)
Allow vertical clearance above the GC/MS.	Dissipate heat and allow for routine maintenance.	≥102 cm (4 in.)
Allow additional bench space beside the Workstation keyboard	Enable mouse operation.	20 cm x 20 cm (8 in. x 8 in.)

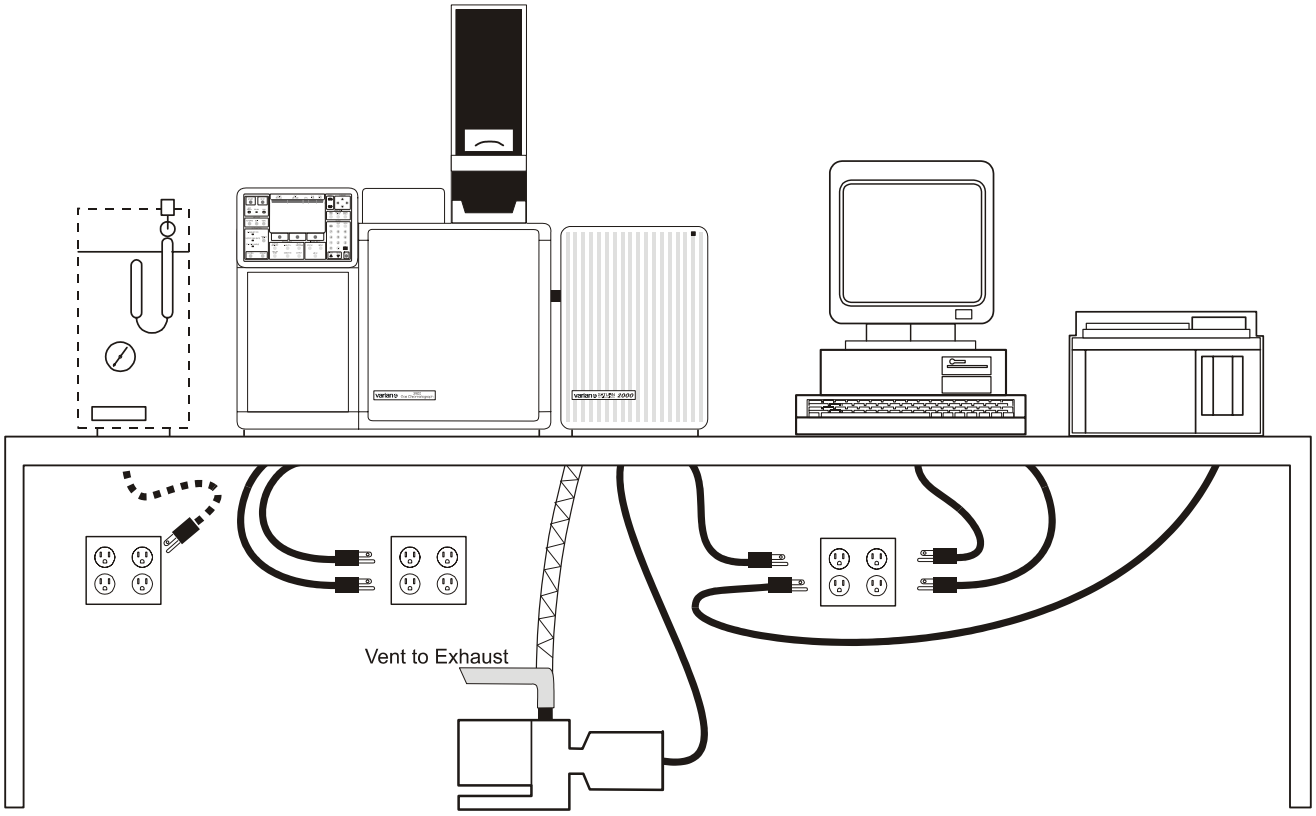

Figure 1 Recommended System Layout

The 24.5 kg (54 lb) mechanical pump belongs on the floor beneath the workbench on which the Saturn system sits. To accommodate the pump, the workbench should be no higher than 91 cm (36 in.); if you use a higher table, be sure to place a suitable stand or support under the table to elevate the pump. If your bench adjoins a wall, you will either need to drill a 38 mm (1.5 in.) diameter hole through the bench to accommodate the vacuum hose, or to place a suitable shelf above and behind the Saturn GC/MS for the pump.

Power Requirements

You are responsible for providing two dedicated fourplex single-phase power sources with earth grounds hard-wired to the main power panel ground. Within North America these power sources must be 20A, 100-130 Vac, 60 Hz ±3 Hz, and outside North America they must be 10A, 200-260 Vac, 50 Hz ±3 Hz. One of these fourplex power sources is for the mass spectrometer, computer, monitor; and printer the other fourplex power source is for the gas chromatograph and (optional) 8200 AutoSampler. If you have additional sample preparation devices or test equipment, we recommend a separate dedicated power source for their operation.

Care must be taken to ensure that sources of radio frequency interference (RFI) and electromagnetic interference (EMI) are not placed on the same power line, or share the same ground plane, since this can degrade the performance of the GC. Equipment such as motors, solenoids, fluorescent light fixtures, and radio communication transmitters should be isolated from the instrument and connecting cables as much as possible.

The power cable from the GC is approximately 2m (6 ft) long and fitted with National Electronics Manufacturers Association (NEMA) 5-20P power plugs. The NEMA 5-20P power plug and corresponding outlet are shown in Figure 2(a). NEMA 5-20P plugs are rated at 20A and 120 Vac.

The power cable from the mass spectrometer is approximately 2.5m (8 ft) long and fitted with US Standard National Electronics Manufacturers Association (NEMA) 5-15P power plugs. The NEMA 5-15P power plug and corresponding outlet are shown in Figure 2(b). NEMA 5-15P plugs are rated at 15A and 120 Vac.

Systems shipped outside the United States and Canada are fitted with CEE 7/7 plugs; these are rated at 16A and 230 Vac. The CEE 7/7 plug and outlet are shown in Figure 2(c).

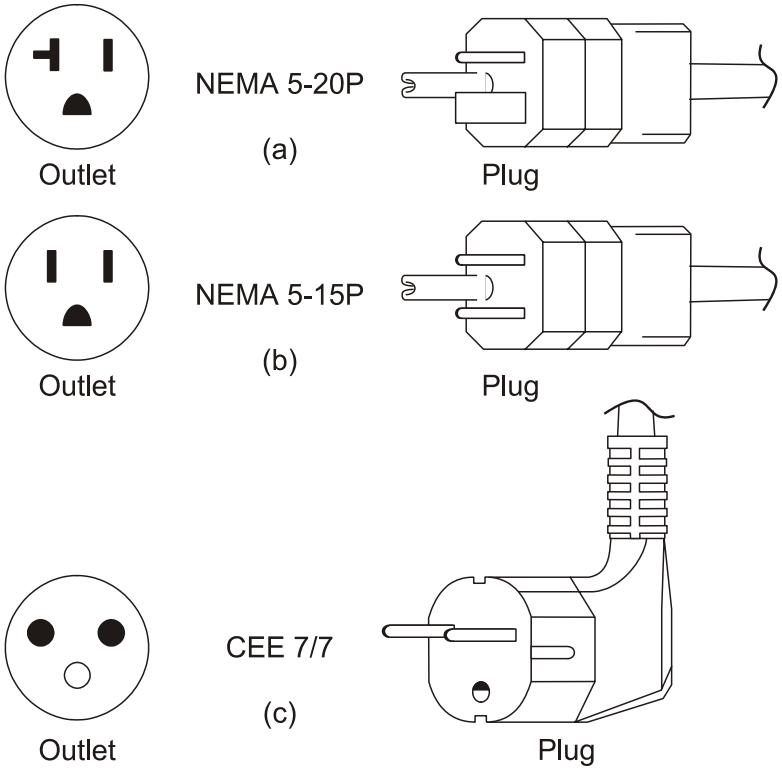

Figure 2 NEMA 5-20P, NEMA 5-15P, and CEE 7/7 Power Plugs and Outlets

The power cables for the computer, monitor, and printer are approximately 2m (6 ft) long. They are fitted with NEMA 5-15P plugs. The power cable from the 8200 AutoSampler is about 2m (6 ft) long, and is fitted with a NEMA 5-15P plug rated at 120V.

With a 120V power source, the maximum amperage requirements for each of the Saturn GC/MS components are as follows:

Component	***Amperes***
Mass Spectrometer	12
CP-3800 Gas Chromatograph	20
3900 Gas Chromatograph	11
CP-8200 AutoSampler	0.5
Computer	3
Monitor	2
Laser Printer	3-4

NOTE: With a 230V power source, the maximum amperage requirement of each of the above components is one-half of the amperage given above.

Never plug the mass spectrometer and the gas chromatograph into the same power source; otherwise, you may overload the fourplex power source. Never use the free outlet on each of the power sources for equipment drawing more than 2A.

The quality of the power supplied to your Saturn GC/MS is very important. The power must be 100-130 Vac, 60 Hz ±3 Hz (200-260 Vac, 50 Hz ±3 Hz outside North America), and it must be stable, i.e., it must be free of fluctuations due to slow changes in the average voltage or to changes resulting from surges, sags, or transients.

- Slow average changes are gradual, long-term changes in the average root mean square (RMS) voltage level, with typical durations greater than 2 seconds.
- Sags and surges are sudden changes in average RMS voltage level, with typical durations between 50 μsec and 2 seconds.
- Transients (or impulses) are brief voltage excursions of up to several thousand volts with durations of less than 50 μsec.

Constant high line voltage or surges in voltage may produce overheating and component failures. Constant low line voltage or sags in voltage may cause the system to function erratically, or even to cease functioning. Transients, even of a few microseconds duration, may cause electronic devices to fail catastrophically or degrade sufficiently to significantly shorten device lifetime. It is important to establish the quality of the line power in your laboratory prior to installation of the Saturn GC/MS.

Occasionally, you may encounter line power sources of unacceptable quality; such power sources may adversely affect the operation of the Saturn GC/MS. You may want to contact a specialist in power conditioning services.

Operating Environment

You are responsible for providing an acceptable operating environment. Attention paid to the operating environment will ensure the continued peak performance of your Saturn GC/MS.

Temperature/Humidity

The optimum operating temperature is between 18° and 21 °C (65° and 70 °F).

NOTE: As laboratory temperature increases, system reliability decreases. All electronic components generate heat while operating. This heat must be dissipated to the surrounding air if the components are to operate reliably.

The turbomolecular pump temperature cutoff control protects the bearing and prolongs its lifetime. If the laboratory temperature is significantly above 27 °C (80 °F), the pump cutoff temperature could be reached; this would cause the pump to shut down.

The diffusion pump's temperature cutoff control protects the fluid from overheating. If the laboratory temperature is above 35 °C (95 °F), the pump will shut down.

There must be a good flow of air around the system. Your air conditioning system must be capable of maintaining a constant temperature (within operational limits) in the immediate vicinity of the system. The average steady-state heat load of the Saturn GC/MS is 6000 BTUs, with a possible short-term heat dissipation of 15000 BTUs during startup.

Hot air vented from the GC column oven may contribute to room heating and to the resulting air conditioning load. Ducting the GC column oven air out of the lab should reduce this heating effect.

The relative humidity (RH) of the operating environment must be between 40 and 80%, with no condensation. Operating a Saturn GC/MS at very low humidity will result in the accumulation and discharge of static electricity shortening the life of electronic components. Operating the system at high humidity will produce condensation and result in short circuits.

Varian recommends that your laboratory be equipped with a temperature/humidity monitor. This will ensure that your laboratory is always in conformance with temperature and humidity specifications.

Particulate Matter

Take necessary precautions to minimize particulates in the laboratory environment. A layer of dust on the electronic components could act as an insulating blanket, and reduce heat transfer to the surrounding air.

Vibration

Ensure that lab benches are free from vibrations, e.g., those caused by equipment in adjoining locations. Because the mechanical pump vibrates during operation, you should install it on the floor beneath the Saturn GC/MS, rather than alongside the system on the workbench.

Exhaust System

It is your responsibility to provide an adequate exhaust system. Most compounds introduced into the mass spectrometer will eventually be exhausted from the mechanical pump, along with the small amounts of oil vapor that these pumps characteristically emit. Therefore, the pump outlets should be connected to a fume exhaust system. Consult local regulations for the proper method of exhausting the fumes from your system.

Gas Requirements

GC Carrier Gases

Helium

Minimum 99.998% ultra-high purity, with less than 1.0 ppm each of water, oxygen, and total hydrocarbons. One 257 ft^3 tank with Matheson regulator #3104-580, or equivalent tank and regulator.

NOTE: The presence of >1 ppm oxygen or water in the carrier gas supply may significantly affect the performance of the Saturn GC/MS; it may also damage such components as the capillary column, filaments, and multiplier. Varian recommends that you verify that your gas suppliers use controlled tanks; this will ensure that purity standards are maintained. If you purchase pure gases in contaminated tanks, you may end up with a contaminated system requiring costly and time consuming repair.

Use of a carrier gas filter is required for optimum performance and to protect your system from potential contamination. Your GC Accessory Kit includes a GC/MS Gas Clean Oxygen/Moisture filter (part number CP-17973) and filter base. This easy-to-remove gas filter cartridge combines three highly adsorptive materials in one filter to remove water, oxygen, and organic compounds to purify the GC/MS gas. Carrier gas filters should be installed in a location where the indicator is visible. The filter should be replaced when the indicator shows that the filter is saturated. For replacement procedures, refer to the instructions enclosed with your filter.

CI Reagent Gases (with CI option only)

Methane, Isobutane

99.99% purity. One lecture bottle with a two-stage pressure regulator, which has a stainless steel diaphragm and maximum inlet pressure of 15 psi (1 bar).

Ammonia

99.99%, anhydrous grade. One lecture bottle with a two-stage pressure regulator, which has a stainless steel diaphragm and maximum inlet pressure of 15 psi (1 bar).

Other Gases

See the CP-3800 GC Pre-Installation Instructions for information on gases required for AutoSamplers and Cryogenic options.

Gas Lines

Methane, isobutane, and ammonia gas supply lines connect directly to the CI gas inlet without any terminating fittings. For other gas line requirements see the CP-3800 GC Pre-Installation Instructions.

Capillary Columns

The Saturn GC/MS accommodates the following GC fused-silica capillary columns:

- Narrow bore: 0.25 mm ID; length ≥15m (50 ft)
- Wide bore: 0.32 mm ID; length ≥30m (100 ft)

Solvents

You will also need the following solvents and reagents as you operate and maintain your Saturn GC/MS.

- Methanol, HPLC grade
- Acetone, HPLC grade

Please handle and store all solvents in accordance with standard safety procedures.

Network Requirements

If you are planning to connect your GC/MS to a company network, you will need to provide a 10Base2 connection (10BaseT for Saturn 2100) to the back panel of the CP-3800 GC or 3900 GC. In addition, the company network must allow TCP/IP communications to be routed across it from the GC to the Saturn GC/MS Workstation. For basic Ethernet cabling information, please refer to the *CP-3800 GC Operator's Manual* or the *3900 GC Getting Started Manual*, included on the Saturn CD. Any hardware, adapters, cables, and configuration and setup work required to convert from the company network wiring type to 10Base2 (or 10BaseT) wiring will need to be provided by you or your network administrator. This hardware must comply with the IEEE 802.3 standard.

Computer/Printer Requirements

Specifications

If you decide to purchase a computer from another vendor, please contact your local Varian Sales / Service Office for pre-purchase advice. The computers that Varian recommends change with the market availability, but they generally meet the following specifications:

Requirements for Windows NT or Windows 2000:

- Pentium processor, at least 500 MHz
- At least 128 MB RAM
- Administrator privilege for installation

Qualified PCs

At the time of this printing, the computers and printers listed below have been tested and found to be satisfactory for use with the Saturn GC/MS Workstation software.

- Dell Optiplex GXa 266 Pentium II
- Dell Optiplex GX-1 350 Pentium II
- Dell Optiplex GX-1 400 Pentium II
- Dell Optiplex GX-1 500 Pentium III
- Dell Optiplex GX-1 550 Pentium III
- Dell Optiplex GX110 667 Pentium III
- Dell Optiplex GX110 800 Pentium III
- Dell Optiplex GX150 1GHz Pentium III
- Dell Optiplex GX260 2.0GHz Pentium 4
- Dell Latitude C610 800 Pentium III

Qualified Printers

- Hewlett Packard DeskJet 660C (with HP 550C driver)
- Hewlett Packard DeskJet 692C or 695C color printer
- Hewlett Packard DeskJet 710C, 810C, or 932C color printer
- Hewlett Packard DeskJet 5550 color printer
- Hewlett Packard LaserJet 4+, 5, 5M, or 5P printer
- Hewlett Packard LaserJet 4000 printer (with PCL 5e driver)
- Hewlett Packard LaserJet 4050 printer
- Hewlett Packard LaserJet 4100 printer
- Hewlett Packard Color LaserJet 4550 printer
- Hewlett Packard LaserJet 6P printer
- Hewlett Packard LaserJet 2100 printer (with PCL 5e driver)
- Lexmark 3000 Color Jetprinter

Inspection

When your Saturn GC/MS arrives, carefully inspect the exterior of the shipping cartons for evidence of any damage that might have occurred during shipment. Inspect the cartons for the following:

- Water stains
- Cuts, punctures, or deep indentations
- Crushed corners or excessively abraded edges

If one or more of the above conditions are evident on any of the shipping cartons, report the conditions to the carrier at time of receipt.

Systems are shipped either **FOB Varian** or **FOB Destination**. The manner of shipment determines who has responsibility for filing a claim against the carrier if the system is damaged in transit. Most systems are shipped **FOB Varian**, and in this instance any damages incurred in shipment are the responsibility of the purchaser and the carrier. Contact Varian Service for assistance with claims filing and billing for repairs if necessary. If the system is shipped **FOB Destination**, contact Varian Order Processing who will file a claim against the carrier. Note, however, that Varian will not accept liability for damage if you receive obviously damaged materials but do not make note of the damage on the receiving documents.

When your Saturn GC/MS arrives, move it indoors to a protected place and call Varian Service to schedule your installation.

Unpacking and Installation

A Varian Customer Service Representative will unpack and install the Saturn GC/MS once it has arrived and you have prepared the installation site. At the time of installation, the customer service representative will demonstrate the fundamentals of operation and maintenance. To take full advantage of this on-site visit, please arrange to have your system operator available during the installation.

At the time of installation, the customer service representative will demonstrate that your system meets the performance specifications written into your sales contract. Please do not make plans to analyze samples with the system until after the installation has been completed and you have accepted the conditions of delivery.

Parts and Supplies

The *Saturn 2000 GC/MS Hardware Manual* provides a list of parts and supplies for routine operation.

Preventive Maintenance

You will be responsible for performing routine and preventive maintenance of the gas chromatograph, mass spectrometer, and data system.

Please note that it is essential that you perform regular preventive maintenance. By performing this maintenance, you will increase the life of the system, increase system uptime, and enjoy optimum system performance. Please refer to the *Saturn 2000 GC/MS Hardware Manual* for details. Your Varian customer service representative will also describe/demonstrate these procedures at the time of installation.

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